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	LEE & HAYES PLLC 421 W RIVERSIDE AVENUE SUITE 500			AMINI, JAVID A	
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Please find below and/or attached an Office communication concerning this application or proceeding.

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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 09/451,256 Filing Date: November 29, 1999

Appellant(s): HOLLASCH, STEVEN R.

Lance R. Sadler For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 12/16/2004.

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

(3) Status of Claims

The statement of the status of the claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Invention

The summary of invention contained in the brief is correct.

(6) Grounds of Rejection

The appellant's statement of the issues in the brief is correct.

(7) Response to Arguments

Applicant on page 14, lines 11-12 argues that the reference Yamrom's method is involved a close-surface polygonal mesh and position relative to the object that is to be modeled.

Examiner's reply: Applicant on page 11 line 8-11 of the specification discloses a plane of the subject matter can be represented with 2 or 3 dimensional, see the equations in line 10 and line 19 on the same page in the specification. Examiner's comment: Conceptually, the 3-D object (it

may contains a plurality of planes similar to fig. 3 of the specification) defines a volume in which the approximation must lie. Therefore, the 3-D object is considered as a close surface.

Applicant on page 14, lines 18-23 observes this approach in a bit more detail; Yamrom teaches that its methodology fits a reduced mesh to the surface of an object to approximate the object. Examiner comment: Applicant on page 9, lines 10-17 teaches similar approach, as follows: through the illustrated and described pre-characterization processing, a sub-set of possible intersected shapes, which has a smaller number of shapes than the total number of shapes that approximate the surface of the object, is defined, with such sub-set being subsequently evaluated to ascertain those shapes within the sub-set that are intersected by the defined ray. Reducing the number of shapes that are evaluated for ray intersections greatly reduces the processing overhead thereby improving processing times.

Applicant on pages 16-17 regarding claim 1 argues that the reference Yamrom does not teach the claim language of the subject matter. Applicant highlighted last part of claim 1 as follows: ".... those shapes that have no chance of intersecting the ray, and those remaining shapes that <u>may</u> intersect the ray". Applicant labeled the statement as an emphasis added.

Examiner's comment: The verb "may" is a broad term, and it does not mean possible, but it means permissible. Examiner's reply: Yamrom in fig. 3's step 14 explicitly specify the claim language as a question: does ray intersect surface of object? Now comparing it with the claim language as "no chance of intersecting the ray, and those remaining shapes that <u>may</u> intersect the ray".

Applicant on page 17 line 21 uses a term "a complex object" that is not specified in the claim 1's language.

Applicant on page 19 lines 20-24 refers to MPEP 2131.

Examiner's reply: According to the MPEP 2131: When a claim covers several structures or compositions, either generically or as alternatives, the claim is deemed anticipated if any of the structures or compositions within the scope of the claim is known in the prior art. Therefore Yamrom satisfies the standard for anticipation under 35 U.S.C. 102 with respect to claim 1's language.

Applicant on page 20 regarding claim 2 argues that the reference Yamrom cannot possibly disclose using a predetermined algorithm to determine which of those intersect the ray. Examiner's reply: Applicant claims a broad language as a "predetermined algorithm". The meaning of the algorithm is a set of ordered steps for solving a problem, such as a mathematical formula or the instructions in a program. The terms algorithm and logic are synonymous. The reference, Yamrom in cols. 3-4, lines 23-67; lines 1-67 respectively, discloses predetermined algorithm especially in col. 4 lines 3-22 the instruction in a program. Examiner's comment: Applicant does not explicitly specify the type of algorithm in the claim language. Applicant on pages 20-29 regarding claims 3-15 argues similar to the pervious arguments. Applicant on pages 31-53 regarding claims 16-22, 24-33, 35-56 argues similar to the pervious arguments. Applicant on page 45 regarding, claim 39 argues that the reference Yamrom does not teach even a single plane. Examiner's reply: Yamrom in col. 6 lines 22-67 teaches (x,y) plane. Applicant on page 53 regarding claims 23 and 34 rejected under U.S.C. 112 first paragraph, argues that the claims are enabled, and the claims claim two or more polygons or triangles in the invention.

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Examiner's reply: regarding the question on page 54 lines 1-2, and claims claim two or more polygons or triangles. In figs. 3-12 of the specification that each figure illustrates more that two polygons (triangles) and they share at least a vertex. For example: a vertex v3 in fig. 3 has been shared between polygon (triangle) 304 and 302. Therefore, the examiner strongly disagrees with the claim language in claims 23 and 34.

Applicant on page 56, second paragraph discloses that the Examiner does not understand the claim language is following the language of the specification.

Examiner's reply: Examiner strongly disagrees with Applicant's argument. Examiner believes that Applicant uses incorrect language "none of the triangles share any vertices" and Examiner refers Applicant to study the following publications conscientiously (copies are enclosed) then evaluate them with claim's language. Examiner believes that the Applicant meant using the terms "vertex removal" and "edge collapse" (see publications enclosed) instead of the claim language "none of the triangles share any vertices". Examiner effectually encourages Applicant to refer to the publications enclosed.

Examiner's comment: Most current simplification algorithms are iterative in nature, applying small, local changes to the mesh, each of which removes a small set of triangles and replaces it with a different, smaller set of triangles. The simplification operation varies from algorithm to algorithm, with the most popular being vertex removal [Schroeder et al. 1992; Cohen et al. 1996; El-Sana and Varshney 1997] and edge collapse [Garland and Heckbert 1997; Lindstrom and Turk 1998; Hoppe 1996]. Vertex removal, (see Applicant's fig. 5) removes a vertex and all triangles incident upon it, and then triangulates the resultant hole in the model. Edge collapse, (see Applicant's fig.6) combines the two vertices of an edge into one, removing all resulting

degenerate faces and edges. The order in which operations are applied is a key differentiating feature among algorithms, and is typically based upon weighting each potential operation, and greedily performing the operation with lowest cost. With edge collapse algorithms, there is also the question of where to place the collapsed vertex. *Subset placement* requires it to be in the same position as one of the original vertices. Other alternatives include allowing positions anywhere along the edge, or anywhere at all in space (which usually is guided by some heuristic, such as minimizing quadric error [Garland and Heckbert 1997]).

For the above reasons, it is believed that the rejections should be sustained.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-22, 24-33 and 35-56 rejected under 35 U.S.C. 102(e) as being anticipated by Yamrom.

1. As per claim 1, "defining a reference object relative to the represented object", Yamrom in abstract discloses a method for modeling an object with a polygonal mesh (examiner's interpretation: pre-determined shapes) includes obtaining a closed-surface polygonal mesh (examiner's interpretation: reference object) and positioning the closed-surface polygonal mesh

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relative to the object (examiner's interpretation: represented object). As for "determining the positions of the shapes relative to the reference objects using the characteristic data" Yamrom in abstract discloses the existence of an intersection point between said ray and a surface of the object is determined and the location (Examiner's interpretation: position using the characteristic data, see Fig. 4 of Yamrom) of the point-of-interest is adjusted in response to the existence and location of the intersection point. As for "determining, on the basis of the positions of the shapes relative to the reference object, those shapes that have no chance of intersecting the ray, and those remaining shapes that may intersect the ray", Yamrom illustrates clearly in Figs. 3 and 5 that at step 14, it is determined that the ray does not intersect surface, then flow proceeds to step 18 where the projected position is determined based on a reference distance (Examiner's interpretation: the basis of the positions of the shapes relative to the reference). Both steps 16 and 18 proceed to step 20 where the process ends if all points are processed. If not, step 22 locates the next point for processing. In Fig. 5 shows a similar projection in which the object is placed inside the reduced mesh. Due to holes (Examiner's interpretation: the basis of the positions of the shapes relative to the reference) in the object, the ray 34 may not intersect the surface 36. Yamrom in fig. 3's step 14 explicitly specify the claim language as a question: does ray intersect surface of object? Now comparing it with the claim language as "no chance of intersecting the ray, and those remaining shapes that may intersect the ray".

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As per claim 2, "The method of claim 1 further comprising using a predetermined algorithm to determine which one of those remaining shapes intersects the ray", Yamrom in col.
 lines 6-35 illustrates cylindrical projection algorithm.

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2. Claims 3-4, "The method of claim 1, wherein the collection of shapes comprises at least one or plurality of polygonal shape/s", Yamrom in Figs. 2 and 10 illustrates it.

- 3. Claims 5 and 6, "wherein the collection of shapes comprises at least one or plurality triangle/s", Yamrom in Figs. 2 and 10 illustrates it.
- 4. Claims 7-9, "The method of claim 1, wherein the collection of shapes comprises a triangle mesh/strip/fan", Yamrom in Figs. 2 and 10 illustrates it.
- 5. Claims 10, 11, 14 and 15, Yamrom illustrates in Figs. 4 and 5. And also see col. 1, lines 50-52. The step of the reference object comprises a plane is inherent because in order to establish a model (or approximation) of an object, one must define the X, Y and Z planes parameters. That would be the same as the ray X and Y planes. In this case the plane becomes parallel to one of the x, y and z-axes.
- 6. Claims 12 and 13, "The method of claim 1, wherein said determining the positions of the shapes comprises determining positional aspects of sub-components of individual ones of the shapes to provide the characteristic data", "The method of claim 12, wherein the individual shapes comprise polygons and the sub-components comprise vertices that define the polygons, said determining the positions of the shapes comprising computing the positions of the vertices relative to the reference object"; Yamrom in Figs. 3-5 illustrates, how to determine the characteristic data. Yamrom in col. 2, lines 31-47 teaches the positions of the vertices relative to the reference object.
- 7. As per claim 16, "defining a collection of polygons that approximate an object, individual polygons having a plurality of vertices", "As for casting a ray toward the approximated object"; "defining a reference object relative to the collection of polygons and that contains the cast ray",

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"pre-characterizing at least some vertices of at least some of the polygons to provide characteristic data that describes the vertices position relative to the reference object; and using the characteristic data to ascertain the positions of the individual polygons relative to the reference object.", Yamrom in abstract discloses a method for modeling an object with a polygonal mesh includes obtaining a closed-surface polygonal mesh and positioning the closedsurface polygonal mesh relative to the object. Yamrom in abstract discloses the existence of an intersection point between said ray and a surface of the object is determined and the location (Examiner's interpretation: position using the characteristic data, see Fig. 4 of Yamrom) of the point-of-interest is adjusted in response to the existence and location of the intersection point. Yamrom illustrates clearly in Figs. 3 and 5 that at step 14, it is determined that the ray does not intersect surface, then flow proceeds to step 18 where the projected position is determined based on a reference distance. Both steps 16 and 18 proceed to step 20 where the process ends if all points are processed. If not, step 22 locates the next point for processing. In Fig. 5 shows a similar projection in which the object is placed inside the reduced mesh. Due to holes in the object, the ray 34 may not intersect the surface 36.

- 8. As per claim 17, "wherein the collection of polygons approximate the surface of the object", Yamrom in Fig. 2, illustrates it.
- 9. Claims 18 and 19, as for "wherein the individual polygons have a similar geometry; and wherein the individual polygons comprise triangles", Yamrom in Fig. 2 illustrates the features of these claims.

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10. As per claim 20, "wherein the collection of polygons has a plurality of faces and a plurality of vertices, said faces outnumbering said vertices", Yamrom in Fig. 2 illustrates the features of this claim.

- 11. Claim 21 and 22, as for "wherein at least two of said polygons share at least one side; at least two of said polygons share is at least one vertex", Yamrom in Fig. 2 illustrates the features of these claims.
- 12. Claims 24 –27, Yamrom in abstract discloses a method for modeling an object with a polygonal mesh includes obtaining a closed-surface polygonal mesh and positioning the closed-surface polygonal mesh relative to the object. Yamrom in abstract discloses the existence of an intersection point between said ray and a surface of the object is determined and the location (Examiner's interpretation: position using the characteristic data, see Fig. 4 of Yamrom) of the point-of-interest is adjusted in response to the existence and location of the intersection point. Yamrom illustrates clearly in Figs. 3 and 5 that at step 14, it is determined that the ray does not intersect surface, then flow proceeds to step 18 where the projected position is determined based on a reference distance. Both steps 16 and 18 proceed to step 20 where the process ends if all points are processed. If not, step 22 locates the next point for processing. In Fig. 5 shows a similar projection in which the object is placed inside the reduced mesh. Due to holes in the object, the ray 34 may not intersect the surface 36.
- 13. Claim 28, Yamrom in Fig. 2 illustrates the features of this claim.
- 14. Claims 29-30, Yamrom in Figs. 2 and 3 illustrates the features of these claims.
- 15. Claims 31-33, Yamrom in abstract discloses a method for modeling an object with a polygonal mesh includes obtaining a closed-surface polygonal mesh and positioning the closed-

surface polygonal mesh relative to the object. Yamrom in abstract discloses the existence of an intersection point between said ray and a surface of the object is determined and the location (Examiner's interpretation: position using the characteristic data, see Fig. 4 of Yamrom) of the point-of-interest is adjusted in response to the existence and location of the intersection point. Yamrom illustrates clearly in Figs. 3 and 5 that at step 14, it is determined that the ray does not intersect surface, then flow proceeds to step 18 where the projected position is determined based on a reference distance. Both steps 16 and 18 proceed to step 20 where the process ends if all points are processed. If not, step 22 locates the next point for processing. In Fig. 5 shows a similar projection in which the object is placed inside the reduced mesh. Due to holes in the object, the ray 34 may not intersect the surface 36.

- 16. Claim 35, Yamrom in Fig. 2 illustrates the features of this claim.
- 17. Claim 36, the step of the reference object comprises a plane is inherent because in order to establish a model (or approximation) of an object, one must define the X, Y and Z planes parameters. That would be the same as the ray in the X and Y planes. In this case the plane becomes parallel to one of the x, y and z-axes.
- 18. As per claim 37, "defining a sub-set of polygons from a collection of polygons that approximate an object by determining which polygons have vertices that satisfy a predefined relationship relative to a reference object; and evaluating the sub-set of polygons to ascertain which of the polygons is intersected by a cast ray", Yamrom in abstract discloses a method for modeling an object with a polygonal mesh includes obtaining a closed-surface polygonal mesh and positioning the closed-surface polygonal mesh relative to the object. Yamrom in abstract discloses the existence of an intersection point between said ray and a surface of the object is

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determined and the location (Examiner's interpretation: position using the characteristic data, see Fig. 4 of Yamrom) of the point-of-interest is adjusted in response to the existence and location of the intersection point. Yamrom illustrates clearly in Figs. 3 and 5 that at step 14, it is determined that the ray does not intersect surface, then flow proceeds to step 18 where the projected position is determined based on a reference distance. Both steps 16 and 18 proceed to step 20 where the process ends if all points are processed. If not, step 22 locates the next point for processing. In Fig. 5 shows a similar projection in which the object is placed inside the reduced mesh. Due to holes in the object, the ray 34 may not intersect the surface 36.

- 19. Claims 38 and 39, Yamrom illustrates in Figs. 4 and 5. And also see col. 1, lines 50-52.
- 20. Claim 40, Yamrom in abstract discloses a method for modeling an object with a polygonal mesh includes obtaining a closed-surface polygonal mesh and positioning the closed-surface polygonal mesh relative to the object. Yamrom in abstract discloses the existence of an intersection point between said ray and a surface of the object is determined and the location (Examiner's interpretation: position using the characteristic data, see Fig. 4 of Yamrom) of the point-of-interest is adjusted in response to the existence and location of the intersection point. Yamrom illustrates clearly in Figs. 3 and 5 that at step 14, it is determined that the ray does not intersect surface, then flow proceeds to step 18 where the projected position is determined based on a reference distance. Both steps 16 and 18 proceed to step 20 where the process ends if all points are processed. If not, step 22 locates the next point for processing. In Fig. 5 shows a similar projection in which the object is placed inside the reduced mesh. Due to holes in the object, the ray 34 may not intersect the surface 36.
- 21. Claim 41-42; see Yamrom in col. 8, lines 19-38.

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22. Claim 43, Yamrom in abstract discloses a method for modeling an object with a polygonal mesh includes obtaining a closed-surface polygonal mesh and positioning the closed-surface polygonal mesh relative to the object. Yamrom in abstract discloses the existence of an intersection point between said ray and a surface of the object is determined and the location (Examiner's interpretation: position using the characteristic data, see Fig. 4 of Yamrom) of the point-of-interest is adjusted in response to the existence and location of the intersection point. Yamrom illustrates clearly in Figs. 3 and 5 that at step 14, it is determined that the ray does not intersect surface, then flow proceeds to step 18 where the projected position is determined based on a reference distance. Both steps 16 and 18 proceed to step 20 where the process ends if all points are processed. If not, step 22 locates the next point for processing. In Fig. 5 shows a similar projection in which the object is placed inside the reduced mesh. Due to holes in the object, the ray 34 may not intersect the surface 36.

- 23. Claims 44-46, Yamrom in Figs. 2 and 3 illustrates the features of these claims.
- 24. Claim 47, the step of the reference object comprises a plane is inherent because in order to establish a model (or approximation) of an object, one must define the X, Y and Z planes parameters. That would be the same as the ray X and Y planes. In this case the plane becomes parallel to one of the x, y and z-axes.
- 25. Claim 48, Yamrom in abstract discloses a method for modeling an object with a polygonal mesh includes obtaining a closed-surface polygonal mesh and positioning the closed-surface polygonal mesh relative to the object. Yamrom in abstract discloses the existence of an intersection point between said ray and a surface of the object is determined and the location (Examiner's interpretation: position using the characteristic data, see Fig. 4 of Yamrom) of the

point-of-interest is adjusted in response to the existence and location of the intersection point. Yamrom illustrates clearly in Figs. 3 and 5 that at step 14, it is determined that the ray does not intersect surface, then flow proceeds to step 18 where the projected position is determined based on a reference distance. Both steps 16 and 18 proceed to step 20 where the process ends if all points are processed. If not, step 22 locates the next point for processing. In Fig. 5 shows a similar projection in which the object is placed inside the reduced mesh. Due to holes in the object, the ray 34 may not intersect the surface 36.

- Claim 49, Yamrom in Figs. 2 and 3 illustrates the features of these claims. 26.
- As per claim 50, "A computer graphic processing system comprising: a processor; 27. memory; and software code stored in the memory that causes the processor to implement a ray-intersection algorithm which: casts a ray at a collection of shapes that approximate an object: defines a reference object that contains the ray; pre-characterizes aspects of individual ones of the shapes of the collection to provide characteristic data; and uses the characteristic data to ascertain the position of the shapes of the collection of shapes relative to the reference object.", Yamrom in abstract discloses a method for modeling an object with a polygonal mesh includes obtaining a closed-surface polygonal mesh and positioning the closed-surface polygonal mesh relative to the object. Yamrom in abstract discloses the existence of an intersection point between said ray and a surface of the object is determined and the location (Examiner's interpretation: position using the characteristic data, see Fig. 4 of Yamrom) of the point-ofinterest is adjusted in response to the existence and location of the intersection point. Yamrom illustrates clearly in Figs. 3 and 5 that at step 14, it is determined that the ray does not intersect surface, then flow proceeds to step 18 where the projected position is determined based on a

reference distance. Both steps 16 and 18 proceed to step 20 where the process ends if all points are processed. If not, step 22 locates the next point for processing. In Fig. 5 shows a similar projection in which the object is placed inside the reduced mesh. Due to holes in the object, the ray 34 may not intersect the surface 36.

- 28. Claims 51, 52 and 53, Yamrom in Fig. 2 illustrates the features of these claims. Yamrom in col. 7, lines 6-35 illustrates cylindrical projection algorithm.
- 29. Claim 54, Yamrom in Fig. 2 illustrates the features of this claim.
- 30. Claim 55, Yamrom illustrates in Figs. 4 and 5. And also see col. 1, lines 50-52.
- 31. Claim 56, Yamrom in Fig. 2 illustrates the features of this claim.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 23 and 34 rejected under 35 U.S.C. 112, first paragraph, as based on a disclosure which is not enabling. "Wherein none of polygons share a vertex" critical or essential to the practice of the invention, but not included in the claims is not enabled by the disclosure. See *In re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976). The claim language does not have any logical meaning, because it is not clear whether the invention uses a single polygon or plurality of polygons. How does the approximation of an object detect with only one polygon? However in the specification on page 10 lines 10 sets forth as follows: Other collections can be defined where none of the triangles share a vertex. Therefore the claims languages are not following the specification languages. Examiner believes that the Applicant meant using the terms "vertex"

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removal" and "edge collapse" instead of the claim language "none of the triangles share any vertices". Examiner effectually encourages Applicant to refer to the publications enclosed.

Respectfully submitted,

Javid A Amini Examiner Art Unit 2672

Javid Amini April 25, 2005

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Advisory Action After the Filing of an Appeal Brief

The reply filed 16 December 2004 is acknowledged.

Application No.	Applicant(s)
09/451,256	HOLLASCH, STEVEN R.
Examiner	Art Unit
Javid A Amini	2672

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

1. 🗆	The reply filed on or after the date of filing of an appeal brief, but prior to a final decision by the Board of Patent
	Appeals and Interferences, will not be entered because:

- a.
 The amendment is not limited to canceling claims (where the cancellation does not affect the scope of any other pending claims) or rewriting dependent claims into independent form (no limitation of a dependent claim can be excluded in rewriting that claim). See 37 CFR 41.33(b) and (c).
- b. The affidavit or other evidence is not timely filed before the filing of an appeal brief. See 37 CFR 41.33(d)(2).
- 2. The reply is not entered because it was not filed within the two month time period set forth in 37 CFR 41.39(b), 41.50(a)(2), or 41.50(b) (whichever is appropriate). Extensions of time under 37 CFR 1.136(a) are not available.

Note: This paragraph is for a reply filed in response to one of the following: (a) an examiner's answer that includes a new ground of rejection (37 CFR 41.39(a)(2)); (b) a supplemental examiner's answer written in response to a remand by the Board of Patent Appeals and Interferences (37 CFR 41.50(a)(2)); or (c) a Board of Patent Appeals and Interferences decision that includes a new ground of rejection (37 CFR 41.50(b)).

- 3. The reply is entered. An explanation of the status of the claims after entry is below or attached.
- 4.

 ☐ Other: Examiner attached form PTO-892 (2 pages).

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